ROYAL BOTANIC GARDENS, KEW.

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XLIV.—ECANDA RUBBER.

(*Raphionacme utilis*, Brown & Stapf.)

In the *Kew Bulletin*, 1908, pp. 209–215, and pp. 305–307, an account has been given of *Raphionacme utilis*, Brown & Stapf, and of the rubber prepared from its tubers. Since these accounts were published Mr. John T. Norman, of the City Central Laboratory, London, E.C., has sent a further consignment of the tubers of the Ecanda rubber plant, which were brought over from Angola by his client, Mr. J. Neale May.

Mr. May holds a large concession of land near Bihe, Angola, where *Raphionacme utilis* grows in abundance, and he has kindly furnished particulars as to the mode of growth of the plants under natural conditions and of the country in which they are to be found. From this information the following account has been written.

The tubers of Ecanda rubber recently received at the Royal Botanic Gardens came from a plateau near Bihe, in about 17° E. long. and 12·5–13° S. lat., at an elevation of 5,000 ft. above sea level. This plateau, which forms the concession, occupies an area of some 25 sq. miles, and slopes away fairly steeply towards the east and west, forming the divide between two river systems. The plant though found in considerable quantity in the region generally, does not appear to flourish in other places so well as on the plateau.

The plateau is crossed by the main route from Benguella to Lake Tanganyika, and is distant from the port of Benguella some 420 miles by wagon road. The distance across country to the port by bush paths is much shorter and occupies about twenty days, as the wagon road makes a considerable detour to the south in order to cross certain mines. In fine weather the journey by wagon road can be made in about thirty days.

The climate is fairly damp and rain falls during five or six months of the year. The rainy season commences about January ; heavy rains are not frequent, but the rains are more like those of England, and there is a considerable amount of damp mist. During

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the dry season no rain ever falls, but mists and heavy dews prevail at night-time. In the wet season the rivers rise about 20 ft. and fall some 2–3 ft. below their normal level in the dry season.

The soil of the plateau is a deep and very sandy loam of finely divided, clean black earth four or more feet in depth. This soil retains moisture readily though it never cakes or runs together ; it is always very warm beneath the surface, giving the impression that fermentation is proceeding. It is possible to dig a hole with a stick to a depth of three or four feet as in sand.

The plateau is covered with a very fine grass, growing to a height of not more than 2 ft., and the *Raphionacme* plants are found growing plentifully among the grass. Off the concession (plateau) the growth of the grass is very rank and coarse, some 6 to 7 ft. high, and is almost impossible to penetrate.

The plants grow with the leaves closely pressed to the surface of the ground, forming a kind of rosette after the manner of plantains on a lawn. The tubers usually occur buried just below the surface of the soil, and may be shaped either like a turnip or peg-top, or may be very broadly napiform to discoid. They produce from one to three leafy shoots, each bearing four to six pairs of leaves, and as a rule only one of the shoots produces an inflorescence. The shoots are quite short, but in old plants the inflorescence may be borne on a longer stalk about 2 ins. in length. Unless burnt by bush fires it appears that the leaves remain green, and the tubers continue to grow throughout the year. Of the tubers sent to Kew by Mr. Norman, the discoid ones were the larger, and one of the specimens weighed 2 lbs. 5 ozs. Mr. May, however, states that a large number of the tubers weigh from 4–5 lbs., and that he has found a specimen weighing as much as 15 lbs. It seems probable that there may be more than one species of *Raphionacme* growing on the plateau, but whether the tubers of different shapes belong to different species cannot yet be determined. An inflorescence borne by one of the discoid tubers proves this plant to be *Raphionacme utilis*, though in the general shape and colour of the leaves it differed somewhat from the plant already described (*K.B.*, 1908, p. 215, and *Bot. Mag.* tab. 8221). Mr. May is inclined to believe that there are probably five or six different kinds of rubber-yielding tubers. One kind in particular bears a much larger tuber than the true Ecanda plant, and has finely cut leaves "like a tuft of grass." In this plant the skin or rind of the tuber is coarse like the bark of a tree, and the latex occurs only in the rind. In shape and size the tubers resemble a rugby football. In the Ecanda plants the veins of the leaves may or may not be purple on the underside.

The flowers of *R. utilis* have already been described, but those of Mr. May's plant were of a deep claret colour and borne in a terminal cluster.

The plants usually flower on the plateau in November and early December, the driest time of the year, and the seed is ripened at about the end of December, just before the commencement of the rainy season. Seed is produced in quantity but it tends to be destroyed in great part as the natives burn off the grass among which the plants are growing, just before the rainy season sets in.

The collection of the seed is difficult and to trade costs in goods the equivalent of about £4 per oz.

The tubers are collected by the natives on the plateau in the following manner. The fine grass and general vegetation covering the country is set on fire and the tubers, which can then be easily seen, are hoed up and brought to headquarters in baskets. Large and small tubers are gathered indiscriminately, but the contents of the baskets are weighed and sorted, and only those of large size are kept for the production of the rubber. The two illustrations from photographs, taken by Mr. May on the concession plateau, shew a quantity of the Ecanda tubers brought in by the natives for the extraction of the rubber. The smaller ones are thrown aside, and as they are not materially damaged by the burning of the grass, they are replanted and commence to grow again quite readily.

No attempt at the cultivation or clearing of the ground has been attempted, nor have any experiments been made with the sowing of seed. In replanting the smaller tubers a hole is simply dug in the earth amongst the grass with a native hoe and the tuber is planted and left to grow unattended.

As to the rate of growth of the tubers, it is unfortunate that at present we have no reliable information. According to Professor Geraldes (*K.B.*, 1908, p. 214) the plants are biennial (?), and one-year old plants are stated to be about 3–4 ins. in diameter, and to weigh from 7–10½ ozs. Mr. May has not made any careful observation but is of the opinion, however, that a three-year old root would weigh about 6 ozs. As the natives always burn the long grass once a year in order to obtain fresh herbage, he thinks that these fires may possibly check the growth of any tubers over which they pass. We have been informed that the yield of tubers, on an experimental plantation in a neighbouring region, at a minimum estimate is likely to be 8 tons, and that there is every prospect that a yield of about 12 tons per acre will be realised.

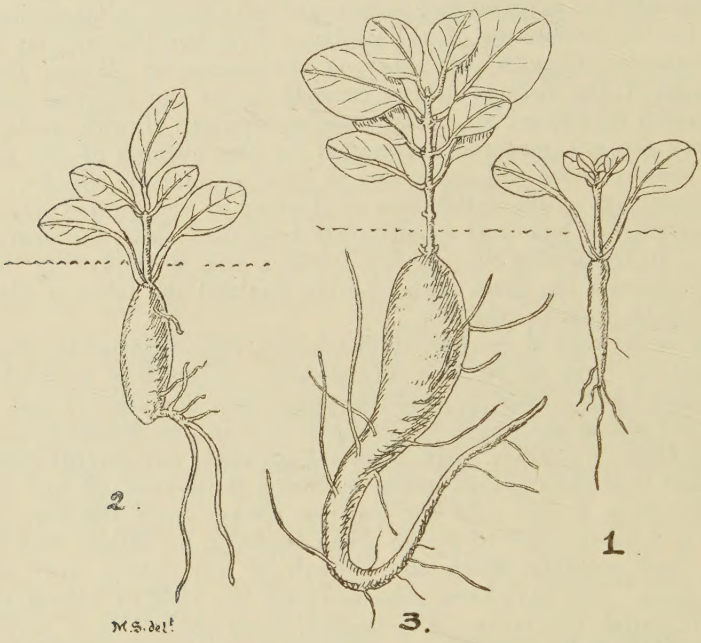
Seedlings of Raphionacme utilis.

In connection with the question of the rate of growth of the Ecanda plant the behaviour of some seedlings raised in the Royal Botanic Gardens, Kew, is of some interest. At the end of December, 1908, a parcel of Ecanda seed was received from the Anglo-Angolese Trading Company, Benguella, 9, Billiter Street, London, E.C., with the following note : "Seeds of the Ecanda tuber, called also 'Vitinga' or 'B'tinga' plant by the Angolese, from the district of M' Bongo, Serra Andrade Corvo, South Angola between 12° 50′ and 14° S. lat. and 14° 40′ and 15° 20′ E. long. ; altitude given as between 1,200 and 1,500 m." Some of these seeds were distributed to various suitable Botanic Gardens and some were sown at Kew, on the 2nd January of this year. The seeds germinated quickly and developed two cotyledons with petioles nearly 1 cm. in length ; the laminæ are oblong-obovate obtuse, glabrous and slightly fleshy.

The plumule usually develops with an elongated first internode, about 1 cm. in length, the subsequent internodes being short. The internodes are delicately hairy with short glandular hairs. The

plumular leaves, which shew a decussate arrangement, are more or less ovate, glandular, and have a well-marked mid rib. In the course of two months the young shoot has reached the stage shewn in Fig. 1, and at the end of seven months the seedlings have grown to the size shewn in Figs. 2 and 3.

The development of the tubers below ground proceeds somewhat slowly as shewn in the figures :—



At the end of two months the tap root had swollen to form an elongated fusiform tuber 1 cm. long by about 2 mm. in diameter, and during this time it is pulled deeper into the soil by the action of root shortening. The tuberous root in the largest example, Fig. 3, is some 4–5 cm. in length and 9 mm. in diameter.

Some seeds were also received at Kew from the Botanic Gardens, Dahlem, Berlin, under the name of *Nitinga rosea* in August, 1908, which germinated, and it is now possible to recognize that the young plants are probably seedlings of *Raphionacme utilis*, the name *Nitinga* being apparently a corruption of the native name B'tinga or Vitinga.

These latter plants, now a year old, have a single shoot which has grown continuously and is about 3 cm. long with five pairs of leaves crowded towards the shoot apex. The tuber which is becoming more globular measures 1·5 cm. in diameter. Although Mr. May is of the opinion that the Ecanda plants grow more quickly in Angola than they do at Kew, it appears clear that the *Raphionacme* is not a biennial plant as was at first suggested.

In the Bulletin of the Imperial Institute, vol. vi., 1908, pp. 390–393, a short account of the analysis of the tubers of the *Bitinga* rubber plant is given, derived from specimens received from the Mozambique Company.

Explanation of Plate.

1. Natives trading tubers of *Raphionacme* at Mr. May's permanent camp.

2. A load of tubers spread out to dry in the sun after the wagons had crossed a river.

XLV.—DIAGNOSES AFRICANAE: XXXI.

1041. Cephalonema, *K. Schum. in Schlechter, Westafr. Kautschuk—Exped.* 299 ; *De Wild. in Ann. Mus. Congo*, sér. 5, i. 53, 164 ; ii. 46, 298 ; *Miss. É. Laurent*, i. 151 ; nomen ; De Wild. Not. Pl. Util. Congo, 29 ; gen. nov. [Tiliaceae—Tilieae]; affinis *Honckenyae*, Willd., a qua staminibus numerosissimis, stigmatibus subulatis et fructu alato differt ; descriptio (auct. *T. A. Sprague*).

Inflorescentia ut in *Honckenya*. *Flores* quoad calycem et corollam tetrameri. *Sepala* extus infra apicem corniculata. *Petala* lutea. *Staminodia* numerosissima, extra stamina inserta. *Stamina* numerosissima, interiora exterioribus sesquilongiora. *Ovarium* oblongum, acute angulatum, 5–6–loculare ; stigmata subulata, anthesi haud reflexa ; ovula pro loculo numerosa, biseriata. *Capsula* oblonga, 5–6–alata, 5–6–locularis, alis rigide setoso-ciliatis, ceterum non setosa.

Cephalonema polyandrum, *K. Schum. l.c. ; De Wild. ll. cc. ;* nomen (species unica).

Folia late ovata, indivisa, vel angulato-suborbicularia, interdum leviter triloba, basi cordata, apice longe acuminata, 9–14 cm. longa, 6–10 cm. lata, subdupliciter serrata, supra exsiccando brunnea, sparse stellato-puberula praecipue in nervis, subtus pallidiora, in nervis stellato-pubescentia ceterum puberula, basi 7–nervia, nervis supra obviis subtus conspicuis, tertiariis regulariter parallelis plerumque 2–4 mm. distantibus ; petioli 3–7 cm. longi ; stipulae subulatae, obtusae, circiter 6 mm. longae, ferrugineo-pubescentes. *Sepala* spathulato-linearia, 2 cm. longa, superne 3 mm. lata, 3 mm. supra basin leviter constricta 1·5 mm. lata, extra minute puberula, cornu subapicali 0·7 mm. longo. *Petala* oblanceolata, 1·8 cm. longa, 5–6 mm. lata, ciliolata. *Staminodia* ultra 100, usque ad 9 mm. longa ; antherae rudimentariae 0·3–0·4 mm. longae. *Stamina* circiter 80, exteriora 1·1 cm. longa, interiora 1·6 cm. longa ; antherae staminum breviorum 0·7 mm. longae, longiorum fere 1 mm. longae. *Ovarium* circiter 2 mm. longum, pentagonum vel hexagonum, pubescens, cito post anthesin setosum, loculis angulis oppositis ; stylus circiter 5 mm. longus ; stigmata 5–6, leviter divergentia. *Capsula* 3·5–4 cm. longa, alis 3–5 mm. latis, setis rigidis sparse minute puberulis 2–4 mm. longis ; septa post dehiscentiam fibroso-ciliata, fibris ascendentibus. *Semina* plano-convexa, ambitu late obovata, ultra 2 mm. longa, fere 2 mm. lata, facie convexa leviter tuberculata.

Cameroons. Yaunde, *Zenker*, 1488. Congo Free State. Between Kisantu and Popocabaka, *Gillet*, 2298 ; near Kimuenza, *Gillet*, 1683 ; valley of the Djuma River, *Gillet*, 2734 ; *Gentil ;* in

thickets and at the edges of woods near Coquilhatville, *Schlechter*, 12594; at Eala, *Marc Laurent;* Equateur District, *Pynaert;* Lulonga, *Pynaert*, 764; *É. Laurent;* Romée, *É. Laurent.* Spanish Gaboon (?), *Tessmann*, 475.

According to De Wildeman, *C. polyandrum* is known under the following native names in the Congo Free State: "Punga," "Lotiti," "Dolukonge," "Bekonge," "Lokonge." A rather silky fibre is extracted from it by the natives. At Eala, the native name "Dolokonge" is applied to *Honckenya ficifolia*, which also yields a fibre.

Cephalonema is closely allied to *Honckenya*, the chief differences being as follows:—

Honckenya. Leaves not acuminate, tertiary nerves irregular. Petals purplish. Stamens 16 or fewer. Stigmas linear, obtuse. Capsule not winged, bristly all over.

Cephalonema. Leaves acuminate, tertiary nerves regular, parallel. Petals yellow. Stamens very numerous. Stigmas subulate. Capsule winged, the wings fringed with bristles, elsewhere not bristly.

1042. **Ceropegia Brownii**, *Ledger* [Asclepiadaceae]; affinis *C. mozambicensi*, Schltr., sed floribus multo majoribus lobis erecto-conniventibus valde diversa.

Caulis volubilis, glaber. *Folia* patentia, vix vel tenuiter carnosa, glabra; petiolus 0·5–1 cm. longus; lamina 2–5·5 cm. longa, 1–2·5 cm. lata, lanceolata vel ovata, acuta vel acuminata, basi acute cuneata, margine obscure ciliato-dentata. *Pedunculi* ad nodos laterales, 1–1·3 cm. longi, glabri, 1–2 flori. *Bracteae* minutae. *Pedicelli* 5–6 mm. longi, glabri. *Sepala* 4 mm. longa, e basi attenuata, acuta, glabra. *Corollae* tubus 4–4·2 cm. longus, basi inflatus, parte inflata 1–5 cm. longa 7 mm. diam. supra medium constricta, superne cylindricus et 3 mm. diam., apice abrupte dilatatus, late infundibuliformis et 1·5 cm. diam., extra glaber, pallide virens, ad apicem albido-virens, fusco-maculatus, intra superne glaber, inferne (inflata parte superiore excepta) albo-pilosus, pallide virens, basi supra constrictionem purpureo-maculatus, infra constrictionem fusco-virens striatus; lobi erecto-conniventes, 1·5 cm. longi, basi (explanati) deltoidei, superne lineares, arcte replicati, laete-virentes, ad medium zona alba cum zona atropurpurea superposita ornati, intra (apice excepto) pilis atropurpureis longis pilosi, ad apicem tantum pilis longissimis tremulis subclavatis purpureis ciliati. *Corona exterior* 1 mm. longa, columna staminum duplo brevior, 5-saccata, truncata, glabra, extra alba, maculo semicirculari atrato notata, intra atropurpurea. *Coronae interioris* lobi 3·3 mm. longi, basi antheris arcte incumbentes, superne erecti, subclavati, plus minusve connati, albi, basi atropurpureo-marginati, glabri.

Uganda. Mabira Forest, *Brown.*

Described from a living plant sent by Mr. Ernest Brown (after whom it is named) to Mr. W. Ledger, of Wimbledon. It is nearly related to *C. mozambicensis*, Schltr., having a similar double inflation at the base of the corolla-tube, but has much larger flowers, with connivent-erect (not incurved-connivent) corolla-lobes and other differences.

1043. Ceropegia dentata, *N. E. Brown* [Asclepiadaceae]; species affinis *C. convolvuloidei*, A. Rich., sed foliis dentatis, cymis subsessilibus et corolla extra glabra distinctissima.

Caulis volubilis, gracilis, puberulus. *Folia* herbacea, longe petiolata, utrinque parce et minute pubescentia; petiolus 2–3 cm. longus; lamina 4–5 cm. longa, 3·5–4·5 cm. lata, late cordato-ovata, grosse et acute dentata, apice abrupte et longe acuminata, lobis basalibus late rotundatis. *Cymae* ad nodos laterales, subsessiles, 5–7-florae. *Bracteae* minutae. *Pedicelli* 7–10 mm. longi, graciles, glabri. *Sepala* 2·5 mm. longa, e basi attenuata, glabra. *Corollae* tubus 1·1–1·2 cm. longus, basi globoso-inflatus et 8 mm. diam., superne cylindricus et 2·5 mm. diam., apice haud ampliatus, sed loborum basibus desuper productis et projectis, extra glaber, albus, basi atropurpureus; lobi 8 mm. longi, erecti, apice connati, e basi deltoidei anguste spathulati, replicati, intra leviter carinati, albidi, basi purpureo-atrati, extra glabri, intra marginibus et carinis pilis albis ciliati. *Corona exterior* 5-loba, glabra, atropurpurea; lobi bifidi, basi breviter transverse oblongi, dentibus 1·5 mm. longis linearisubulatis valde divergentibus. *Coronae interioris* lobi 2·5 mm. longi, subulato-filiformes, inferne conniventes, superne recurvi, glabri, ut videtur atropurpurei.

Portuguese East Africa. Mozambique; Macome, Madanda, 65 m., *W. H. Johnson*, 100.

According to Mr. Johnson the flowers are very charming, white, with purplish-black markings.

1044. Ceropegia hastata, *N. E. Brown* [Asclepiadaceae]; affinis *C. Caffrorum*, Schltr., sed caule graciliore, foliis hastatis et corolla minore differt.

Caulis volubilis, gracilis, 1·5 mm. crassus, basi interdum nodoso-tuberosus, glaber. *Folia* patula, carnosa, glabra; petiolus 2·5–4·5 mm. longus; lamina 1·4–2 cm. longa, basi 6–12 mm. lata, hastato-lineari-oblonga vel hastato-ovata, acuta, lobis vel auriculis basalibus rotundatis vel angulatis. *Pedunculi* ad nodos laterales, 6–8 mm. longi, 1–2-flori, glabri. *Bracteae* minutae. *Pedicelli* 5 mm. longi, glabri. *Sepala* 3 mm. longa, lanceolata, acuta. *Corollae* tubus 1·3 cm. longus, basi globoso-inflatus et 4·5 mm. diam., superne angustior, cylindricus, apice levissime ampliatus, 3·5–4 mm. diam., extra glaber, intra tenuiter pilosus, pallidus; lobi erecto-conniventes, apice connati, 5·5–6 mm. longi, basi deltoidei, medio constricti, apice spathulato-ovati, replicati, intra carinati, extra glabri, intra pilis longis atropurpureis deflexis pilosi, atropurpureo-venosi. *Corona exterior* lobulis 5 deltoideis obtusis erectis coronae interioris lobis oppositis et eis basi adnatis cum sinubus 5 truncatis alternantibus, glabra, albida (?), basi intra atropurpureo maculata. *Coronae interioris* lobi 2 mm. longi, erecto-conniventes, apice leviter recurvi, anguste lanceolati, acuti, glabri, albi (?).

Cape Colony. Uitenhage Division; near Bethelsdorp, *Mrs. T. V. Paterson*, 656.

Described from a specimen preserved in formalin, forwarded to Kew by Dr. Schönland. Its position in the series of South African species is between *C. Caffrorum*, Schltr. and *C. assimilis*, N.E.Br.

1045. **Caralluma sacculata**, *N. E. Brown* [Asclepiadaceae]; affinis *C. Sprengeri*, N.E.Br., sed corolla tubo campanulato lobis longiore et corona exteriore 5-sacculata facile distinguitur.

Caules erecti vel basi decumbentes, 5–8 cm. alti, absque dentibus ultra 1 cm. crassi, 4-angulati, glabri; anguli dentibus 8–11 mm. longis subulatis acutissimis persistentibus muniti. *Flores* in fasciculum 3–4-ni aggregati, prope apicem ramorum dispositi. *Pedunculi* erecti, 6–8 mm longi glabri. *Sepala* 6 mm. longa, lanceolata, acuminata, glabra. *Corolla* tubuloso-campanulata; tubus siccatus, 8–10 mm. longus, basi 6–8 mm. diam., superne angustatus, utrinque glaber, virescens ut videtur; lobi patentes, 5 mm. longi, 3 mm. lati, deltoideo-ovati, marginibus revolutis, extra glabri, intra minutissime puberuli, atropurpurei. *Corona exterior* 5-sacculata, 3·5 mm. longa, 5 mm. diam., columnae staminum aequilonga, glabra, sacculis apice breviter bifidis. *Coronae interioris* lobi 1·75 mm. longi, lineares, obtusi, glabri, antheris incumbentes, apicibus erectis, basi cum corona exteriore connexi.

Southern Abyssinia, *Drake-Brockman*, 129.

1046. **Faurea decipiens**, *C. H. Wright* [Proteaceae-Proteeae]; species *F. speciosae*, Welw., affinis, perianthio extus pubescente differt.

Arbor parva. *Rami* primum pubescentes. *Folia* ovato-lanceolata vel elliptica, 17 cm. longa, 5–7 cm. lata, supra glabra, nitida, subtus laxe pubescentia, marginibus recurvis; nervi laterales plures, tenues, utrinque conspicui, intra marginem arcuatim connexi; petioli 12 mm. longi, plano-convexi, pubescentes. *Spicae* ad apicem ramorum singulatim vel fasiculatim dispositae, 23 cm. longae, densiflorae; bracteae minutae, deltoideae, acutae, tomentosae. *Perianthium* tenue, 16 mm. longum, extus pubescens; tubus 1 mm. diam. ante anthesin; lobi oblongi, acuti. *Squamae* hypogynae breviter triangulares, acutae, interdum bifidae. *Antherae* lineares, obtusae, mucronatae. *Ovarium* ovoideum, pilis longis vestitum; stylus quam perianthium paullo brevior.

British Central Africa. Nyasaland: Shire Highlands, *Adamson*, 75; *Buchanan*, 1; Tshimennze, 1,070 m., *Kirk*.

1047. **Protea Elliottii**, *C. H. Wright* [Proteaceae-Proteeae]; species *P. angolensi*, Welw., affinis, perianthii tubo villoso differt.

Frutex. *Rami* juveniles albo-pilosi, demum glabrescentes. *Folia* late ovata, obtusa, basi cuneata et subpetiolata, 14 cm. longa, 7 cm. lata, primum pilosa, coriacea, pallide viridia; nervi laterales ascendentes, utrinque prominentes; nervi marginales crassi. *Capitula* terminalia, globosa, 11 cm. diam.; bracteae extus appresse sericeae, exteriores late ovatae, interiores oblanceolatae, obtusae, 5 cm. longae, 10 mm. latae. *Perianthium* 4·5 cm. longum, dense villosum, basi pilis fasciculatis 8 mm. longis instructum; labium anticum naviculare, posticum angustum. *Antherae* lineares, 7 mm. longae; connectivum apice subulatum. *Stylus* perianthio paullo longior; stigma parvum.

Northern Nigeria. Zungeru, *Elliott*, 2; *Dalziel*, 69.

1048. **Protea Kirkii**, *C. H. Wright* [Proteaceae-Proteeae]; species *P. abyssinicae*, Willd., affinis, nervis lateralibus foliorum patentibus differt.

Rami lignosi, teretes, primum dense ferrugineo-pubescentes, demum glabri. *Folia* e basi lata sessilia, oblonga, apice rotundata,

10 cm. longa, 2·5 cm. lata, glabra; nervi laterales conspicui, patentes, utrinque prominentes, marginales crassi. *Capitula* ad ramos terminalia, sessilia, 6·5 cm. diam.; bracteae extus tomentosae, dense ciliatae, exteriores ovatae, 6 mm. longae, interiores oblanceolatae, 4 cm. longae, 6 mm. latae. *Perianthium* 4 cm. longum, dense ferrugineo-pilosum, pili basilares 8 mm. longi. *Antherae* lineares, 6 mm. longae, apice mucrone brevi subulato instructae. *Styli* 4·5 cm. longi, triangulares.

Portuguese East Africa. Moramballa Mountain, 910 m. *Kirk*.

1049. **Protea trichanthera**, *Baker* [Proteaceae-Proteeae]; species *P. madiensis*, Oliv., affinis, nervis lateralibus foliorum patentibus differt.

Frutex. *Rami* pubescentes. *Folia* brevissime petiolata, oblonga, 13–15 cm. longa, 6–7·5 cm. lata, obtusa, basi deltoidea vel rotundata, rigide coriacea, supra viridia glabraque, subtus pallidiora denseque pubescentia; nervi laterales tenues, utrinque prominentes, intra marginem arcuatim connexi. *Capitula* globosa, 8 cm. diam.; bracteae extus sericeae, apice demum glabrae, exteriores breves, late ovatae vel suborbiculares, intimae oblongae vel oblanceolatae. *Perianthium* 5 cm. longum, parte inferiore glabrum, parte superiore densissime villosum; lobi acuti. *Antherae* lineares, 1·5 cm. longae, obtuse mucronatae. *Ovarium* ovoideum, pilis ferrugineis 1·5 cm. longis vestitum; stylus apice attenuatus.

British Central Africa. Nyasaland: Tanganyika Plateau; Fort Hill, 1070–1223 m., *Whyte*.

1050. **Monadenium invenustum**, *N. E. Brown* [Euphorbiaceae]; affinis *M. Goetzei*, Pax, sed foliis multo brevioribus orbiculare-ovatis vel subrhomboideo-ovatis marginibus crenulatis vel crispulis differt.

Caulis 15–35 cm. (vel ultra ?) altus, glaber. *Folia* utrinque pilis minutissimis adspersa; petiolus 4–5 mm. longus; lamina 1·2–3 cm. longa, 1·2–2·5 lata, orbiculari-ovata vel subrhomboideo-ovata, apice acuta, basi cuneata vel subrotundata, marginibus crenulatis vel crispulis. *Cymae* axillares, nutantes, 1·2 cm. longae, involucros 3 gerentes. *Pedunculi* 4–5 mm. longi, recurvi. *Bracteae* in cupulam 6 mm. longam, obliquam, antice apertam, apice breviter bifidam dorso bicarinatam connatae, microscopice puberulae. *Involucrum* 4–5 mm. longum, truncatum, antice ad medium apertum. *Ovarium* microscopice puberulum, angulis crispulis.

British East Africa. Kibwezi, *Kässner*, 717; Simba *Kässner*, 729.

XLVI.—CORNUS MACROPHYLLA, AND SOME ASIATIC CONGENERS.

W. Botting Hemsley.

In connection with the figuring of *Cornus macrophylla*, Wall., for the Botanical Magazine, Mr. Bean called attention to the fact that the species cultivated under this name at Kew and elsewhere in the United Kingdom is different from the one known as

such on the Continent, which is the same as the one known here under the name of *brachypoda*. A comparison of the Kew *C. macrophylla* with the original type specimens confirmed the correctness of the name adopted. Against this it was found that the Kew *brachypoda* was incorrectly named. Briefly stated, two species, or, according to the views of some botanists, three species are concerned in this confusion. In the following classification, the forms in question are placed under two species, one having opposite leaves, the other alternate. How or where the error originated is unimportant, but Dr. E. Koehne is responsible for describing *C. macrophylla*, in the place cited below, as having alternate leaves, and also for describing the genuine *C. macrophylla* under the new name of *C. corynostylis*. Thus, the species having alternate leaves is without a name, and for this species the name *controversa* is here proposed. It is only fair to repeat here that the late Mr. C. B. Clarke, in the Flora of British India, included specimens having alternate leaves under *C. macrophylla*, Wall., and this may have led Dr. Koehne, and others, to the conclusion that this name belonged properly to the species having alternate leaves. In the synonymy below of *C. macrophylla* and *C. controversa* it has not been considered necessary to include references to every place in which incorrect names are on record. Incidentally it may be added that the flowers of *Cornus* offer no striking modifications, and the species are based largely on vegetative characters.

Cornus macrophylla, Wall. in Roxb. Fl. Ind., Carey & Wallich edition, 1820, vol. i., p. 433; Wall. Cat. 469; C. B. Clarke in Hook. f. Fl. Brit. Ind., vol. ii, p. 744, excl. exempl. foliis alternis et var. *Stracheyi*; Collett, Fl. Siml., p. 219; Brandis, For. Fl., p. 252, t 32; Hemsl. in Journ. Linn. Soc. Bot., vol. xxiii., p. 345, excl. *Cornus sp. affinis C. alternifoliae*, S. Moore, et exempl. ex Amoy, Fortune, 2; J. H. Veitch in Journ. R. Hort. Soc., 1902–3, vol. xxvii., p. 861, cum habitus figura; Hemsl. in Bot. Mag. t. 8261. *C. brachypoda*, C. A. Mey. in Mém. Acad. St. Petersb., vol. vii. (1845), p. 223; Rehder in Sargent Trees and Shrubs, vol. i., p. 81, t. 41; Koehne in Gartenfl., vol. xlvi., p. 94. *C. sanguinea* et *C. alba*, Thunb. Fl. Jap., pp. 62, 63, non Linn., et *C. glauca*, Blume ms. *C. Thelicanis*, Lebas in Rev. Hort. 1875, p. 394, f. 64. *C. Theleryana* et *C. Religiana*, Hort. *C. crispula*, Hance in Journ. Bot., 1881, vol. xix., p. 216. *C. ignorata*, Shirasawa, Ic. Ess. For. Jap., vol. i., p. 121, t. 77, ff. 1–12. *C. corynostylis*, Koehne in Gartenfl., 1896, vol. xlv., p. 286, f. 51, et Mitt. der Deutschen Dendrol. Gesellsch. 1903, pp. 33, 36, 44.

C. macrophylla, Wall., as here limited, ranges from the North-west Himalayas to China and Japan, though it does not appear to have been collected in the Eastern Himalayas. Throughout this wide range there is the same kind and extent of variation as in *C. controversa*, described in the account of that species below; but there are equally highly developed conditions of *C. macrophylla* from Kumaon, Hupeh, Ningpo, and Nagasaki, all having leaves, 15–20 cm. long on the flowering branches, glaucous beneath, and all having large inflorescences. Specimens in the Kew Herbarium, received from Leyden in 1865 and 1867, and labelled *Cornus brachypoda*, C. A. M., Japonia, may perhaps be accepted as

correct. They are undistinguishable from cultivated specimens named *C. Thelcryana*, and characterised by having smaller leaves, pale but not decidedly glaucous on the under surface, and by the calyx-teeth being larger than in typical *C. macrophylla* from Kumaon, and as figured in the Botanical Magazine, t. 8261. *C. glauca*, Blume (ined. ?), received by Bentham from Leyden in 1853, is the same, as well as a specimen from Zuccarini's herbarium labelled *Cornus* (*sanguinea*, Thb.), Legit in Japonia de Siebold. Communicavit Zuccarini, anno 1843 ; the last sentence in Bentham's handwriting.

There are other specimens, both wild and cultivated, more or less intermediate in dimensions and other characters, so that it is impossible to sort them into two groups. For example, cultivated specimens received from Mr. B. E. C. Chambers, of Haslemere, in 1900, have leaves about 10 cm. long, pale on the under surface, except the brown nerves, and are neither typical *C. macrophylla*, Wall., nor typical *C. brachypoda*, C. A. M. It is of importance and great interest to know whether there have been importations both from India and the far east.

India : Murree, *Thomson*, *Bellew* ; Hazara, *Stewart* ; Kashmir, *Clarke*, *Edgeworth* ; Simla, *Lady Dalhousie*, *Collett* ; Garhwal, *Jameson* ; Kumaon, *Wallich*, 469, *Strachey & Winterbottom*, *Thomson*, *Madden*.

China : Szechuen, Mt. Omi, *E. H. Wilson*, 4951a, 4952 ; Hupeh, various localities, *A. Henry*, 725, 5506, 6266, 7434 ; *E. H. Wilson*, 1152, 1935, 1935a, 2268 ; Ningpo mountains, *Faber*, 77.

Japan : Yokohama and Nagasaki, *Maximowicz* ; Nagasaki, *Oldham*, 467 ; without locality, *Siebold*.

The *Cornus scabrida*, Franch. in Nouv. Arch. Mus. Hist. Nat. Par., sér. 2, vol. viii., p. 250, is of this affinity, but I have seen no authenticated specimen.

Cornus ulotricha, C. K. Schn. et Wang. in Fedde Repert. 1909 ; Schneider, Handb. der Laubholzk. vol. ii., p. 445.

China : Hupeh ; without exact localities, *E. H. Wilson*, 984, 2174, 2341.

This differs from *C. macrophylla*, Wall., in the curled hairs on the under surface, especially of the leaves, and in the disk and style being hairy. Whether intermediate conditions exist is uncertain.

Cornus controversa, *Hemsl.*, species hucusque cum *C. macrophylla*, Wall. (*C. brachypoda*, C. A. Mey.) ab auctoribus nonnullis confusa, a qua differt tamen imprimis foliis alternis longe graciliterque petiolatis.—*Corni species* 2 alternifoliae gerontogeae nondum (ut apparet) descriptae, S. Moore in Journ. Bot. 1877, vol. xv., p. 292. *C. macrophylla*, Koehne in Gartenfl., 1896, vol. xlv., p. 285, cum drupae figura ; Shirasawa, Ic. Pl. Jap., vol. i., t. 77, ff. 13–23, non Wall. *C. brachypoda*, Hort., praecipue anglic., non C. A. Mey. ; Koehne, Dendrol. 1893, p. 435. *C. macrophylla*, C. B. Clarke in Hook. f. Fl. Brit. Ind., vol. ii., p. 744, quoad exempl. foliis alternis.

So far as I know only one other species of *Cornus* with alternate leaves has been described, namely, *C. alternifolia*, Linn. f., a North American shrub or small tree, bearing smaller leaves, sparsely

clothed on the lower surface with simple hairs and relatively small cymes of flowers. Koehne seems to have been the first to publish a description of the Asiatic species having alternate leaves, though unfortunately under a wrong name ; but Mr. Spencer Moore, when naming Bisset's Japanese plants upwards of thirty years ago, marked some of the specimens in the Kew Herbarium as " species nova," and published a note on the same in the place cited above. His note runs as follows :—" Vidi in Herb. Kew. *Corni* species 2 alternifoliae gerontogeae nondum (ut apparet) descriptae. Harum altera in regione Sinensi a Fortune et Japonia a Maingay necnon nuper a cl. Bisset referta, ab altera Sikkimensi et Bhotanensi praecipue calyce urceolato (haud campanulato) differt. Ambae C. alternifoliae, Linn. f. sunt affines, sed cymis laxis facile distinguendae. Vidi etiam C. brachypodae, C. A. Mey. (C. macrophyllae, Wall. ?) specimen ex Herb. Lugd. Bat. comm., in quo fortasse sint folia interdum alterna. Exsistit autem hoc loco quaedam quaestio difficilis ; num haec species sint vere semper alternifoliae."

I have extracted this note in full, because with much additional material under observation I am unable to distinguish two species, and Dr. Koehne also combines the Indian and Chinese specimens under one name.

C. controversa, Hemsl., has nearly as wide a range as *C. macrophylla*, Wall., but it has hitherto not been found in the Western Himalaya. Specimens from different localities, and especially those from the open as compared with those from shade are very dissimilar in aspect, yet I think that all those enumerated below may be classed as one and the same species. In its most highly developed condition, as represented by Wilson's specimens from Hupeh and Szechuen, 233 and 4,951, it is perhaps the most ornamental species of the genus. Briefly described this state is :—

Arbor 9–12 m. alta, ramis florigeris graciliusculis glabrescentibus rubescentibus vel nigrescentibus. *Folia* alterna, longe petiolata ; lamina ovata, elliptica vel orbicularia, 10–15 cm. longa, acuminata, acuta, basi rotundata vel subcuneata, supra cito glabrescentia, viridia, nitida, infra glauca, pilis obscuris medio affixis arctissime appressis instructa, nervis primariis utrinque saepius 6–8 sat conspicuis arcuatis ; petiolus gracilis, 3–7 cm. longus. *Cymae* terminales, percompositae, laxae, maximae usque ad 18 cm. diametro, breviter stipitatae, ramis pedicellisque puberulis. *Flores* albi, numerosi, circiter 10–12 mm. diametro. *Calycis tubus* ecostatus, pilis argenteis densissime vestitus. *Petala* anguste oblonga, subobtusa. *Stamina* petala excedentia. *Stylus* cylindricus, glaber, quam petala dimidio brevior. *Drupa* globosa, 6–8 mm. diametro, pilis paucis argenteis medio affixis conspersa, apice excavata.

As here understood *C. controversa*, Hemsl., includes the specimens as cited :—

India : Sikkim, *Hooker*, 4 ; *C. B. Clarke*, 27747 ; Bhotan, *Griffith*, 893 and 3392, Kew Distribution ; Manipur, *G. Watt*, 6850.

China : Yunnan ; Red River valley, near Manpan, at 600 m., *A. Henry*, 10747A ; Fengchenlin, at 1,800 m., *A. Henry*, 10747B ;

Szechuen, *A. Henry*, 8970 ; Mount Omi, *Faber*, 156 ; same locality, *E. H. Wilson*, 233, 4951.

Corea : Seoul, *Sontag*.

Japan : Various localities, *Bisset*, *Buerger*, *Elwes*, *Maingay*, *Maries*, *Maximowicz*, *Siebold*, *Takeda*.

The investigations connected with *C. macrophylla*, and *C. controversa* brought to light several apparently new species, descriptions of which follow.

Cornus Stracheyi, *Hemsl.*, species cum *C. macrophylla*, Wall., adhuc confusa, a qua tamen bene distincta, imprimis inflorescentiae ramis ferrugineo-pubescentibus, calycis tubo ecostato et dentibus conspicuis.

Rami floriferi validi, striati, glabrescentes, ut videtur atropurpurei. *Folia* semper opposita, petiolata ; lamina tenuis, ovata vel ovato-lanceolata, 10–20 cm. longa, acute acuminata, basi rotundata, nervis primariis lateralibus utrinque circiter 8 supra impressis subtus elevatis ; petiolus 2–4 cm. longus. *Cymae* terminales, erectae, breviter stipitatae, foliis breviores, circiter 10 cm. diametro, densae, multiflorae, fere planae, ferrugineo-pubescentes, ramis crassiusculis ; pedicelli brevissimi. *Flores* expansi non visi ; alabastra bene evoluta circiter 5 mm. longa, acuta. *Calyx* ecostatus, pilis simplicibus et biradiatis intermixtis vestitus ; dentes lineares, 1–1·5 mm. longi. *Drupa* globosa, 4–5 mm. diametro.—*C. macrophylla* var. *Stracheyi*, C. B. Clarke in Hook. f. Fl. Brit. Ind., vol. ii., p. 744.

India : Kathi, Kumaon, at 2,250 m., *Strachey* and *Winterbottom ; T. Thomson*, 715.

Cornus Mombeigii, *Hemsl.* ; inter species sinenses ob folia rotundato-cordata pilis longis biramosis crispulis mollibus praecipue subtus dense vestita insignis.

Rami ultimi cymas ferentes crassiusculi, cito glabrescentes, purpurascentes, lenticellis parvis instructi. *Gemmae* elongatae, teretes, angustae, circiter 1 cm. longae. *Folia* opposita, petiolata ; lamina orbiculari-cordata, 4–9 cm. diametro, acuminata, acuta, basi cordata vel interdum fere rotundata, subtus inter nervos albido-tomentosa, nervis ferrugineis, supra viridia, puberula, nervis primariis utrinque 7–9 arcuatis sat conspicuis ; petiolus 1·25–2 cm. longus. *Cymae* terminales, breviter stipitatae, folia vix excedentes, 7–10 cm. diametro, densae, multiflorae, ramis pedicellisque crassis ferrugineo-villosulis. *Flores* circiter 12 mm. diametro. *Calyx* ut petala extra villosulus, dentibus fere filiformibus circiter 0·5 mm. longis. *Petala* ovato-oblonga, obtusiuscula. *Stamina* petala superantia. *Discus* carnosus, prominens. *Stylus* petalis brevior, cylindricus. *Drupa* non visa.

China : Yunnan ; Tsekou, *Père Mombeig*.

Cornus poliophylla, *C. K. Schn. et Wang.*, in Fedde Repert. 1909 ; Schneider, Handb. der Laubholzk. vol. ii. p. 447.

China : Hupeh ; Fang, *E. H. Wilson*, 2167, 2341.

This is allied to *C. Mombeigii*, Hemsl., differing in the much slenderer inflorescence and denser tomentum of the foliage and other characters. Some of the leaves of Wilson's 2341 are indeed very like those of the species in question.

Cornus Hemsleyi, *C. K. Schn. et Wang.*, in Fedde Repert. 1909; Schneider, Handb. der Laubholzk. vol. ii., p. 446.

China: Hupeh, *E. H. Wilson*, 1385.

In consequence of the fruiting and flowering specimens of *C. Hemsleyi* and *C. poliophylla*, having been intermixed in the distribution of the specimens collected by Wilson, some difficult points arose, which the discovery of the mistake has cleared up. *C. Hemsleyi* has closely appressed hairs on the underside of the leaf, whilst in *C. poliophylla* the hairs are curled and projecting.

Cornus Wilsoniana, *Wang.*, in Fedde Repert. vol. vi. (1908), p. 97; Schneider, Handb. der Laubholzk. ii., p. 444. *C. Walteri*, Wang., in Fedde Repert. vi. (1900), p. 99.

China: Hupeh; Nanto and mountains to the northward, *A. Henry*, 3891, 4555; without exact locality, *E. H. Wilson*, 764.

With copious specimens before me, I have no hesitation in reducing Dr. Wangerin's *C. Walteri*, and Dr. Schneider agrees with me, I believe, on this point.

Cornus Fordii, *Hemsl.*, species *C. Wilsonianae*, Wang., similis sed foliis crassioribus late ovatis vel ellipticis obtusis, nervis primariis utrinque 3 vel 4 tantum et cymis parvis foliis brevioribus differt.

Arbor 5–10 m. alta, novellis, praecipue foliis floribusque, pilis argenteis arctissime appressis medio affixis instructis. Rami fructigeri graciles, internodiis quam foliis multo brevioribus. *Folia* opposita, petiolata, cinerea; lamina subcoriacea, ovato-elliptica, rarius lanceolato-oblonga, 5–12 cm. longa, obtusa, utrinque attenuata vel basi subrotundata, margine obscure crenulato-sinuolata, nervis primariis utrinque saepius 4 tenuibus supra inconspicuis subtus elevatis; petiolus gracilis, 1–2 cm. longus. *Flores* non visi. *Cymae* fructigerae axillares vel terminales, subtrichotomae, 5–10 cm. diametro, laxiusculae, foliis breviores, ramis pedicellisque gracilibus. *Drupa* globosa, circiter 7 mm. diametro.

China: Kwangtung; without locality, *C. Ford*, 297 and 300, 1887; Hupeh; Changyang, *A. Henry*, 7751.

Cornus paucinervis, *Hance* in Journ. Bot. 1881, p. 216; Hemsl. in Journ. Linn. Soc., vol. xxiii., p. 346.

This is one of the species having well-developed calyx-teeth, and an authenticated specimen of *C. quinquenervia*, Franch. in Journ. de Bot. 1896, p. 307, leaves no doubt of its being conspecific.

In addition to those enumerated in the Linnean Society's Journal, the following specimens are of this species, namely: A. Henry, 10800 and 10800A, typical; and A. Henry, 1683A; E. Faber, 282 and 637, var. foliis latioribus nervis minus conspicuis. E. H, Wilson's, 495 from Western Hupeh, and his 4950 from Mount Omi. also belong here.

Cornus oblonga, *Wall.* in Roxb. Fl. Ind., ed. Carey & Wall., vol. i., p. 432; Fl. Brit. Ind., vol. ii., p. 744.

The Chinese specimens bearing the following numbers belong to this species: Yunnan, Delavay, 4699; A. Henry, 9930, 11161; G. Forrest, 382; E. H. Wilson, 2241.

Cornus Bretschneideri, *L. Henry* in Le Jardin, 1899, vol. xiii., p. 309, ff. 154, 155.

Kew possesses living plants bearing this name, but no authenticated specimens. Mr. Bean states that it is of bushy habit, throwing up annually new shoots from the base. Dr. A. Henry's 6696, from Fang, Hupeh, must be very near this species if not the same. It is closely allied to *C. alba*, L., and characterised by having pedicels considerably longer than the ovary.

Cornus chinensis, *Wang.*, in Fedde, Repert., vol. vi., p. 100.

This is closely allied to *C. Mas*, Linn. and *C. officinalis*, Sieb. et Zucc. (Fl. Jap., vol. i., p. 100 t. 50). Indeed, I cannot follow Dr. Wangerin in treating the Chinese specimens as specifically different from the latter. He states that *C. chinensis* differs from both of the species named in having much longer calyx-teeth, and from *C. officinalis* in having tufts of pale grey hairs in the axils of the veins on the underside of the leaves; whereas they are of a rusty brown colour in *C. officinalis*. There are numerous specimens at Kew, both from China and Japan, and the characters on which Dr. Wangerin relies are more or less inconstant, especially the relative size of the calyx-teeth. As for the tufts of hairs in the angles of the veins, they vary considerably, both in quantity and colour. A Japanese specimen, collected by Bisset (n. 1093), has white hairs in quite small tufts. On the other hand they are brown or white on different leaves of the same branch.

I have now no doubt that I incorrectly referred Wilford's 945 from Port Chusan, Corea, to *C. macrophylla*, Wall. in Journ. Linn. Soc., vol. xxiii., p. 345. Dr. Wangerin has since described it (Fedde, Repert., vol. vi., p. 97) under the name of *C. coreana*. It is also closely allied to *C. alba*. Père Faurie's 4353 (1889) "Montagnes de Managata," Japan, is another specimen of the same affinity; but as I have not studied the group to which *C. alba* belongs I must leave these specimens unnamed. *C. australis*, C. A. Mey., belongs to the same group. *C. Schindleri*, Wang., in Fedde, Repert., vol. iv., p. 337, is unknown to me.

XLVII.—TREES NOTED IN DEVONSHIRE.

W. Dallimore.

The contribution of an exhibit to the Forestry section of the "Bath, West of England and Southern Counties Agricultural Show," by the Director of the Royal Botanic Gardens, Kew, furnished the object of my visit to Exeter in June. While in the neighbourhood, I was able to pay visits to a few gardens of interest, where some fine specimens of trees were noted.

Strete Ralegh.

Amongst other interesting trees growing at Strete Ralegh, the S. Devon estate of Mr. H. Imbert-Terry, the following are specially noticeable on account of their size and rarity, *Larix Griffithii*, *Tsuga Brunoniana*, and *Saxegothea conspicua*. It is considered that these particular examples are some of the original introductions to the British Isles, and that they found their way to Strete Ralegh

at the time of the dispersion of the stock of the Exeter nurseries, when the old Veitchian firm dissolved partnership. Of the two first mentioned species single examples only are found, but of the *Saxegothea*, two specimens exist. All four are growing on sloping ground near the top of a hill, at an elevation of 500 ft., but they are sheltered by other trees from the north and east. The ground is rich and is kept continually moist by means of a spring, the water from which percolates through the ground thereabouts. This, with the natural humidity of the atmosphere and mild climate, appears to provide ideal conditions for these trees, for all are somewhat tender and averse to a hot, dry soil and a dry atmosphere.

The specimen of *Larix Griffithii* is about 45 ft. high with a girth of 7 ft. at 3 ft. from the ground. Himalayan travellers describe the species as a tree growing 40 to 60 ft. in height, found at an altitude of 8,000 to 12,000 ft. in the forests of the inner ranges of the Eastern Himalaya (E. Nepal, Sikkim and Bhotan), whilst it also occurs in Tibet at an altitude of from 9,000 to 13,500 ft. Plate XXI. in "Hooker's Himalayan Plants," gives a good idea of the tree and the beauty of the half developed cones. The chief peculiarities of the species are its long, pendulous branches and large cones with prominent scales and bracts which are remarkable for their long reflexed tips. The cones are several times larger than those of other species, being 2½ to 3 inches in length. When young they are purple in colour. As the Strete Ralegh tree is coning profusely this year, it formed a conspicuous object in June. Though introduced as long ago as 1850, very few good specimens are to be found in the country.

Tsuga Brunoniana is also a Himalayan tree and is found in the same forests as *Larix Griffithii*. It attains its largest dimensions in the Lachen Valley, where Sir J. D. Hooker measured a specimen 120 ft. high, with a girth of 28 ft. (Gard. Chron., July 17th., 1886, p. 73). Under cultivation it does not form a single trunk, but branches at a few feet above the ground. The Strete Ralegh specimen is 45 ft. in height, with a girth near the base of 9 ft. 2 ins. It is of graceful outline, and branched to the ground all round. A larger example is recorded by Elwes and Henry in "Trees of Great Britain and Ireland" vol. ii., p. 245, from Boconnoc in Cornwall. This is 53 ft. high, with a girth of 12 ft. *S. Brunoniana* was first cultivated in English gardens in 1838.

Saxegothea conspicua was introduced from the mountains of Patagonia, by Messrs. Veitch, of Exeter, through the agency of their collector Wm. Lobb, in 1849. The Strete Ralegh examples are supposed to have originated from this consignment, and are now 30 ft. in height, the larger of the two having a girth of 4 ft. 3 ins. at 2 ft. from the ground. They somewhat resemble the yew in appearance, but are lighter in outline, The genus was named in compliment to the late Prince Consort, and from that the common name of "Prince Albert's Yew," has originated. When first introduced it excited considerable interest amongst botanists, and Lindley, in a description which appeared in the "Journal of the Horticultural Society" for 1851, pp. 258–263, says: "It may be described as a genus with the male flowers of a Podocarp, the female flowers of a Dammar, the fruit of a Juniper, the seed of a

Dacrydium, and the habit of a Yew." The Strete Ralegh examples are probably the finest in the country, and from their healthy appearance it is evidently a tree that might be planted more extensively in the south-west counties. Although perfectly hardy at Kew, it grows slowly and has a stunted appearance.

Killerton Park.

Killerton Park, Devon, the demesne of Sir Thomas Dyke Acland, Bart., is situated a few miles east of Exeter, in the midst of a beautifully undulated country, consisting of rich agricultural land. The estate is well timbered, and many fine old trees exist of indigenous and exotic species. In the rich soil of the park beech and oak assume magnificent proportions, whilst many fine trees of *Pinus insignis*, *Cupressus macrocarpa* and cedar are to be seen. It is in the gardens, however, that the more interesting trees are to be noted. A collection of the more tender species of *Cupressus* is noticeable, *C. torulosa* being specially worthy of note. The rare *Cunninghamia sinensis* is represented by examples 45 ft. high covered with cones; *Fitzroya patagonica* is 30 ft. high and well furnished with branches; *Thuya plicata* is 80 ft. high, whilst fine examples exist of *Abies cephalonica*, *Pseudotsuga Douglasii*, *Quercus Lucombeana*, and numerous other trees. Shrubs, too, are well represented. Japanese evergreen oaks such as *Quercus cuspidata* and *Q. glabra* form very large bushes; *Kalmia latifolia* is 12 to 15 ft. high and 23 ft. through, *Leucothoe Catesbaei* is represented by a bush 10 ft. through and 3 to 4 ft. high, which in June was a perfect mass of white flowers, whilst a large number of the more recently introduced shrubs are making satisfactory growth. A magnificent bush of *Berberis aristata* was noted; this was 18 ft. high with an enormous spread.

Stevenstone.

In the gardens at Stevenstone, the North Devon seat of Lord Clinton, a very fine collection of Conifers exists, but the majority are young, 40 years old and under. That they like their position, however, is evident from the fact that many have attained a height of from 50 to 65 feet. About the park are many clumps of Coniferous trees which show a remarkable rate of growth, for, though planted but 35 to 40 years ago, Douglas fir and larch are to be found between 70 and 80 ft. in height, with trunks 12 to 15 ins. in diameter. Fine examples were noted of *Magnolia Watsoni* and *Styrax japonica*. The former, though usually a slow grower of indifferent constitution, is represented by a free-growing bush 18 ft. high with seven main branches which, in June, were carrying over 100 open and unopened flowers. The *Styrax* is 16 ft. high, and a good bush.

XLVIII.—COFFEE DISEASES OF THE NEW WORLD.

G. Massee.

1. Mancha or Viruela (*Sphaerostilbe flavida*, Mass.).

The disease known as "mancha,"—spot, or "viruela"—small pox, in allusion to the spotted appearance of the leaves, young

shoots and fruit of infected trees, is almost of equal virulence as a destructive disease in the coffee plantations of Central America and Brazil, as is *Hemileia vastatrix* in similar situations in the old world. It is represented by specimens in the Kew Herbarium from Costa Rica, Guatemala, New Granada, Venezuela, Nicaragua, Dutch Guiana and Brazil. Up to the present the fungus causing this disease has been considered as belonging to the Hyphomycetes, one of the sections included under the term "Fungi imperfecti," and known as *Stilbum flavidum*, Cooke, with *Stilbella flavida*, Lindau, as a variant.

The disease has been known to exist for many years past, and formed the subject of a report in the *Kew Report* for 1876, p. 21. In 1878 Dr. A. Ernst published an account of this disease along with others affecting the coffee plant. Up to this date the true cause of the disease had not been determined, and insects, fungi and climatic influences were respectively considered as primary causes. In 1880 Dr. M. C. Cooke correctly attributed the disease to the presence of a minute parasitic fungus which he described under the name of *Stilbum flavidum*. Under the title "Central American Coffee-disease" some account of the fungus is given in the *Bulletin*, 1899, pp. 91–94. Somewhat similar blotches on the leaves are caused by the mining larva of a small moth—*Cemiostoma coffeellum* (see *Kew Bull.*, 1894, pp. 130–133). The Spanish name for this disease is "Mancha de hierro" or iron spot.

The leaves, young shoots and fruit are attacked. On the leaves the fungus forms scattered, circular whitish patches equally evident on both surfaces, varying as a rule from 5 to 8 mm. (about a quarter of an inch) in diameter. Leaves that are attacked soon become yellow and fall. In severe cases it is stated that a tree may become entirely defoliated within a month of the first appearance of the disease, and as the fungus reproduces itself and spreads rapidly under favourable weather conditions, it not infrequently happens that all the trees in a plantation present the remarkable appearance of being heavily loaded with fruit, but entirely destitute of leaves, as shown in some excellent photographs communicated to Kew by Professor Pittier from Costa Rica. The berries under such circumstances, do not reach maturity.

On the young shoots the diseased spots are whitish and usually more or less elongated; the cortex in such places becomes dry, cracks, and finally breaks away in small flakes, leaving the browned wood exposed. On the berries the spots are as usual, whitish and almost circular in outline. As a rule only one or two spots are present on a berry. After a time the fruit of the fungus appears on these bleached spots in the form of miniature yellowish pins standing erect, from 1·5–2 mm. in height. The stem is very slender, sometimes slightly wavy, and is composed of a fascicle of very thin hyphae cemented together to form a hollow cylinder. The external hyphae give off numerous very short lateral branches, which stand at right angles to the long axis of the stem, imparting to it a spiny appearance when seen under the microscope, but it appears to be smooth under a pocket-lens. At the apex of the stem the hyphae diverge in every direction forming a broadly pyriform head, those on the under side of the head bending downwards

and embracing the uppermost portion of the stem. The free tip of each hypha forming the head becomes swollen into a subglobose cell, from which spring several very slender, simple or sparingly branched conidiophores, each of which bears a single subglobose conidium at its apex. The conidia are hyaline, and average 2·5 μ in diameter. This is the condition known as *Stilbum flavidum*, Cooke, which now proves to be the conidial form of an ascigerous fungus belonging to the genus *Sphaerostilbe*.

Last January a large consignment of diseased coffee berries was received at Kew from New Granada. These berries had been carefully packed and arrived in a comparatively fresh condition; the *Stilbum* being present in abundance. A number of the diseased berries were placed on sterilised, damp cotton wool in Petri dishes, for the purpose of ascertaining whether the conidia could be induced to infect young coffee leaves. All attempts in this direction gave negative results, whether placed on the unbroken surface or on a wounded portion of the leaf; in fact the conidia could not be induced to germinate in any of the various media used. When the berries had been under observation for seven weeks, small clusters of a bright red fungus appeared on the bleached spots occupied by the *Stilbum*. This red fungus proved to be an ascigerous form, belonging to the genus *Nectria* in the wide sense, which has in recent years been broken up into several genera, and those ascigerous forms which develop along with a *Stilbum*-like conidial stage, constitute the genus *Sphaerostilbe*.

The leaves of three young coffee plants, two years old, were infected by placing the ascospores of the *Sphaerostilbe* stage of the fungus, upon definite spots of the unbroken surface of the leaves. At the expiration of 13 days the points of infection were yellowish-green in colour, and during the succeeding week the characteristic white patches bearing the conidial form of the fungus were developed. The ascigerous phase of the fungus did not follow, and it is possible that it does not develop on the leaves owing to lack of nutrition, but only on the fruit and shoots. This is what happens with other species of parasites, as for instance *Sphaerotheca pannosa*, *&c.*

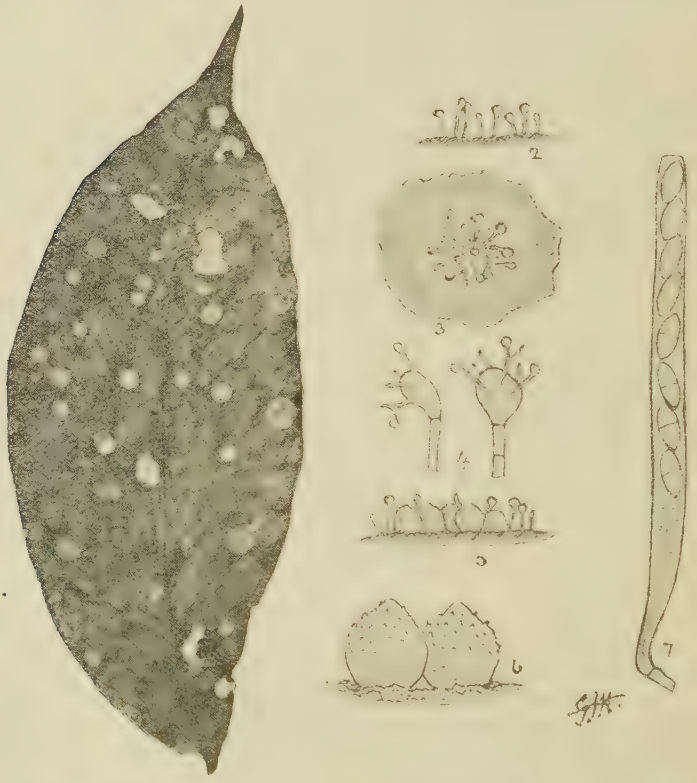
Further attempts to infect young coffee leaves with the fresh conidia produced at Kew, did not meet with success. This has also been the experience of all who have attempted the experiment; in fact no one has as yet succeeded in inducing these supposed conidia to germinate, and it is possible that the conidial condition of the fungus, although still developed, has reached an effete stage, and is no longer of functional value as a reproductive body. If this surmise proves to be correct, then the continuation of the fungus in time must depend entirely upon the ascigerous condition, which previous to the present record had passed unobserved.

There are two distinct ways by which the disease can be continued from year to year:—

(1) Diseased shoots will furnish a crop of ascospores which may infect the foliage and young shoots. When a shoot is once infected the mycelium of the fungus gradually encroaches on the healthy portion, producing a fresh outbreak of fungus fruit each season. From the above account it is obvious that all diseased shoots should

be removed and burned. Results will turn on the thoroughness with which this work is carried out. First year infected shoots may, perhaps, be rather difficult to detect, but a thorough investigation should be made, as the eradication of the disease depends on the removal of all sources of infection.

(2) All diseased fruit, whether hanging or fallen, should be collected and burned, as should also all fallen leaves. This is sometimes a very difficult matter when the lower branches of the trees are weighed down to the ground with fruit; however, a grower of great experience in Costa Rica informed me that it was a great mistake in allowing the lowermost branches of a coffee tree to remain, the result being imperfect aeration of the soil, also imperfect ventilation amongst the branches, and the impossibility of clearing away fallen leaves, &c., or of cultivating the ground.



Sphaerostilbe flavida.—1. Diseased coffee leaf. 2 and 3. Conidial (*Stilbum*) fructification. 4. Fertile tips of conidiophores, bearing conidia. 5. Conidial and ascigerous stages growing intermixed. 6. Perithecia of ascigerous stage. 7. Ascus containing eight ascospores. Fig. 1, half nat. size, the remainder mag.

The following is a diagnosis of the ascigerous condition :—

Sphaerostilbe flavida, *Mass. Perithecia* ovata, in caespitulis suborbicularibus dense congesta, laete rubra, verruculosa, ostiolo prominulo papillato ornata. *Asci* cylindracei, sursum abrupte truncati, octospori. *Sporae* hyalinae, ellipsoideae, utrinque acutatae, 1-septatae, 15 × 6–7 μ.

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2. Tap-root Disease of the Coffee Tree.

This disease is caused by a Nematode or eelworm, and has been recognised in the coffee plantations of São Paulo, in Brazil for some years past, although the definite cause has only recently been determined. A similar disease has been observed in the coffee plantations in Costa Rica, and judging from accounts received at Kew from time to time, it is also present in other districts in Central America. The characteristic symptoms of the presence of the disease depend to a great extent on the age of the tree attacked. When the tree is fairly old the leaves on young twigs turn yellowish-green and shrivel, the young shoots also assume a blackened appearance and wilt. This condition of things may continue for many months before the tree dies. On the other hand, in the case of trees from four to six years of age, having healthy looking dark-green foliage, and laden with berries, no preliminary symptoms are forthcoming and the collapse is sudden.

The tap-root is the part attacked by the eelworm, and presents a very characteristic appearance, becoming much swollen and barrel-shaped, and covered with much thickened, rugged bark sodden with water. The cork-cells of the bark are sac-like and much elongated radially, resembling the palisade tissue of a leaf. The eelworms are present in spaces between these abnormal cork-cells.

The smaller roots usually bear a number of small knots or galls containing eelworms.

Fungal hyphae are also generally present in the abnormal cortical tissues of the tap-root, but the eelworm is the primary cause of disease.

Batches of diseased trees show up very conspicuously and can readily be detected and removed. So far as experience goes a tree that is once attacked never recovers, consequently the wisest course is to remove all such trees and to burn the roots. The disease does not spread very rapidly, but at the same time it gradually extends its area from a central point of infection.

Treating the soil with bisulphide of carbon is the most effective remedy. This should be applied where diseased trees have been removed, and the treatment should also extend well beyond the zone of diseased trees.

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XLIX.—MISCELLANEOUS NOTES.

Mr. J. W. Gallagher, whose appointment as Mycologist to the Agricultural Department of the Federated Malay States was recorded in *Kew Bulletin*, 1907, p. 100, has been appointed Director of the Department in succession to Mr. J. B. Carruthers, whose transfer to Trinidad was announced in *Kew Bulletin*, 1909, p. 150.

Mr. J. W. Campbell, formerly Superintendent of Experimental Plantations in the Federated Malay States (*K.B.*, 1906, p. 383), has been appointed Assistant Director, Agricultural Department, Federated Malay States.

Baikiaea insignis, *Benth.*—A fine healthy specimen of this remarkable Tropical African tree has produced about thirty of its handsome flowers in house No. 1 during August and the early days of September. The Kew specimen was raised from seeds received in 1894 and flowered for the first time in cultivation in 1907. It is now 15 feet high.

The plant was originally described by Bentham in *Benth. & Hook. Gen. Pl.* 581 as the type of a new genus and named in compliment to the distinguished West African traveller, W. Balfour Baikie, R.N. Surgeon to the Niger expedition, from specimens collected in those parts and from the island of Fernando Po. It was also described and figured later on in *Trans. Linn. Soc.*, vol. xxv., t. 41. In the figure the flowers are pendulous; they are, however, erect, and in this respect the figure is erroneous, having been drawn from dried specimens. The plant is stated to reach to a height of 30–40 feet in W. Tropical Africa.

The flowers are ten inches across when fully expanded, and are remarkable as being the largest produced by any member of the *Leguminosae*. The tree is of erect habit, evergreen, with large abruptly pinnate, coriaceous leaves from one to two feet long; pinnae slightly oblique, elliptic, six inches to a foot long, and sometimes as much as four inches in diameter. The flowers are borne in loose clusters on the tips, or in the axils of the upper leaves of the ripened wood of the current year. The calyx is 4 to 5 inches long and divides on opening into four linear segments, the three upper sepals reflex and curl round the stalk of the flower, the two lower remain united and form an erect boat-shaped support upon which rests the large somewhat fleshy lip. The corolla is erect on first expanding, but the petals gradually reflex at the tips and the whole flower is then about 10 inches in diameter. The petals are snow-white, spathalate, 6–6½ inches long and 3 inches broad, with undulating margins. The lower petal or lip is boat-shaped lemon-yellow in colour, and somewhat more fleshy in character than the other members of the corolla. The 10 stamens are in two series, the five longest being equal in length to the petals, the other five an inch shorter. The filaments are slender, villose on the lower half, nine being connate at the base. Anthers linear, versatile, ¾ of an inch long, primrose-yellow in colour. Ovary a slender legume two inches long, style slender, slightly shorter than the petals, stigma capitate, small.

The flowers commence to expand during the afternoon and are fully open about 7 o'clock in the evening, remaining fresh until next morning, when they quickly fade and fall to pieces.

C. P. R.

Silphium albiflorum, *A. Gray*.—This white flowered *Silphium* is at present in flower in a warm border close against a south wall. It is rarely met with in gardens as it is somewhat tender and needs a sheltered position like the above. It is a native of Western and Northern Texas where it is found on cretaceous rocks. Although it was figured in the *Botanical Magazine*, t. 6918 so long ago as 1887 from a plant which flowered with the late Mr. Thompson, of Ipswich, it never increased. The present plant was received from Herr Max Leichtlin, of Baden Baden, in 1907. It is most nearly allied to the well known *S. laciniatum* and has the same kind of foliage, but the whole plant only reaches the height of between two and three feet. The stems are very rigid, and the white flowers, about three inches in diameter, are borne on long peduncles. The whole plant is very scabrid.

Gentiana Freyniana, *Bornm.*—This new species was received from Herr F. Sundermann in 1906, and this year it has flowered freely for the first time in the rock-garden. It is closely allied to the well-known *G. septemfida*, and resembles that species in habit, but has much larger flowers. It also comes from Asia Minor, and as *G. septemfida* is so variable, three varieties being figured in the *Botanical Magazine*, tt. 1229, 1410, and 6497, it may perhaps be regarded as a variety of that species with larger flowers having a more dilated tube. The intermediate lobes are also less laciniate.

W. I.

Remedies for Snake-Bite. -In a note on the subject of "Remedies for Snake-bite" in a previous number of the *Kew Bulletin* (1909, No. 3, p. 156) two species of Acanthaceae were quoted as being specially efficacious. Specimens of these plants had been received from Dr. Arnold Lawson, and their names were given as *Barleria Prionitis*, Linn. and *Justicia Gendarussa*, Linn. f. The first of these, however, proves to be a different species, probably *Barleria lupulina*, Lindl.

As previously described (*Kew Bull.*, loc. cit.) the medicine is taken in the form of an extract made by pounding the leaves and twigs in rice-spirit. A small sample of this solution, together with the leaves and twigs (of *Barleria lupulina ?*), from which it had been prepared, were sent to Kew by Dr. Arnold Lawson.

The material, which was insufficient for any detailed analysis, was handed to Dr. P. Haas, who kindly undertook to examine it for alkaloid- and potassium-constituents. These substances were specially sought for because Boorsma* found, on studying the

* Boorsma, Onderzoek naar de Plantenstoffen van Nederlandsch-Indie, Mededeel. uit 's Lands Plantentuin XXXI, Batavia, 1899.

chemistry of the *Acanthaceae*, that two features marked several species of this family:—(1) the presence of a large amount of potassium, and (2) the occurrence of alkaloids. The same features characterise the material examined by Dr. Haas, as will be seen from his report given below:—

"Report on the Examination of a Sample of Antidote for Cobra-Bite.

"The sample consisted of a clear light-brown solution with a brown sediment.

"The sediment [A] was filtered off and examined apart from the solution [B]; it was extracted with alcohol and tartaric acid, and the filtered extract examined for alkaloids, but none were found.

"The solution [B] was evaporated over a water bath and taken up with dilute hydrochloric acid; the solution so obtained gave characteristic precipitates with the three alkaloidal reagents potassium teriodide (chocolate), phosphomolybdic acid (yellow flocculent turning green) and potassium mercuric iodide (faint precipitate). A portion of the solution [B] evaporated to dryness and ignited left a small quantity of ash which consisted for the most part of potassium.

"The dry plant-remains, from which the above antidote had been prepared, yielded on ignition an ash which contained a considerable quantity of calcium and potassium, but relatively little sodium.

"P. Haas."

It appears possible that an alkaloid might act as an antidote for snake-bite, but the physiological action of the alkaloid in this species of *Barleria* must await further enquiry.

Several species of *Acanthaceae* have been credited with medicinal properties. Thus among reputed remedies for snake-bite are *Rhinacanthus communis*, Nees, *Andrographis paniculata*, Nees, and *Barleria cristata*, Linn.* The leaves of *Adhatoda Vasica*, Nees, "have a reputation as expectorant and anti-spasmodic, and are employed in consumption, coughs, chronic bronchitis, asthma and other pulmonary and catarrhal affections."† *Barleria Prionitis* is quoted by Boorsma as a febrifuge and diuretic, though containing no important organic substances. In this and in several other species of this family the relatively high percentage of potassium present is held by Boorsma to be responsible for any diuretic properties the plants may possess.

In most cases the alkaloids are stated to be present in small quantity, or to be unimportant, but other organic substances may be present, *e.g.*, andrographid in *Andrographis paniculata*, which is used as a remedy for dysentery; and rhinacanthin and cumarin in *Rhinacanthus communis*, which is used in cases of ring-worm.

In *Justicia Gendarussa*, Boorsma determined the presence of an alkaloid, and in *Adhatoda Vasica*, Nees (=*Justicia Adhatoda*, L.) Hooper‡ found an alkaloid (vasicine) and another organic body

* Lindley, Flora medica (1838), pp. 501–2; Boorsma, loc. cit.; Watt, Dict. Econ. Prod. India.

† Hooper, Pharm. Journ., third series, vol. 18, p. 841 (1888).

‡ Hooper, loc. cit., Boorsma, loc. cit.

adhatodic acid). Hooper came to the conclusion that these two bodies are chemically combined in the living plant as adhatodate of vasicine, and that vasicine is the active principle. Sulphate of vasicine was proved by experiment to be poisonous to frogs and leeches. Another experiment made by Hooper consisted in adding a few drops of a strong "solution" of the leaves of *Adhatoda Vasica* to a sample of pond-water containing *Spirogyra*, insect-pupae and numerous *Paramoecia*. The result of the experiment was that the alga and the animal organisms were all killed.

Hooper also tried the effect of an aqueous solution of the alcoholic extract of the leaves on flies, fleas, mosquitoes, centipedes, &c., and observed that it acted as a poison in every case, but he found that a considerable dose of the alcoholic extract given to a dog did not have any injurious effects.

It appears, however, that, as an insecticide, "vasicine cannot be used as at present available. A tartrate is in the market, but cheaper and equally efficacious insecticides already exist."*

It is stated that the fresh leaves of this plant are used in connection with rice-cultivation in some parts of India. They are scattered over the recently flooded fields, and are held by the native cultivators to act both as a manure, and as a poison, which kills the aquatic weeds.†

Assuming that marked medicinal properties are rightly attributed to *Adhatoda Vasica*,‡ it may be expected that some other members of the *Acanthaceae* will prove to contain drugs of a like nature or importance.

L. A. B.

A New Rubber Plant (*Asclepias stellifera*, Schlecht.).—Towards the latter end of last year herbarium specimens of a plant, with a small sample of rubber extracted from it by maceration, were received from Mr. J. Burtt Davy, Department of Agriculture, Transvaal. The sample of rubber was prepared by Mr. J. Ivens Ferraz, Official Translator to the High Commissioner of the Transvaal, but was too small to admit of a commercial valuation being placed upon it; the herbarium material, however, was sufficiently complete to allow of its botanical origin being satisfactorily determined.

Asclepias stellifera is a native of South Africa, growing from 3 to 10 ins. high, and, according to *Flora Capensis*, is found in the coast region at an altitude of 3,500 to 4,000 ft., in the Kalahari region at 4,000 to 6,000 ft., and in the Eastern region at 3,500 to 4,500 ft.

The rubber is yielded by the root, which is stated to be very long and perennial. The plant has been found in hard ground on the veld, struggling with all sorts of weeds, but thriving better where no other plants existed.

Upon comparing the specimens of the plant sent with material in the Herbarium, Mr. N. E. Brown found that in the tissues of a root-stock of a dried specimen collected 46 years ago, the rubber contained in them was quite as elastic as in the recently-collected

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* Watt, The Economic Products of India (1908), p. 25.

† Watt, The Econom. Prod. India (1908); Hooper, loc. cit.

‡ Hooper, l.c.

material. Mr. Brown also points out that as there are several other species of *Asclepias* with much the same habit as the plant in question, it is just possible that some of them may also contain rubber, but in most cases the root-stocks are wanting in the herbarium specimens.

Subsequently nine larger samples of the rubber were received from the same source, and though few details bearing upon the varied methods adopted to bring about coagulation accompanied the samples, they were submitted for opinion to Messrs. Hecht Levis & Kahn, the well-known rubber experts, who found only one sample, which had been obtained from incisions without further treatment, to be worthy of serious consideration. This sample was found to be rubber of good quality and would probably have realized at the time (14.4.09) about 4*s.* 6*d.* per lb.

J. M. H.

Ancient British Oak Stake.—To the many examples of Oak of historical interest already contained in the Museums, one other of great local interest has been added through the generosity of Mr. Montagu Sharpe, D.L., Chairman of Middlesex Quarter Sessions, in the form of an ancient British stake extracted from the bed of the Thames at Brentford.

The following particulars of this interesting relic are taken from "The Great Ford across the Lower Thames," being the title of an exhaustive paper on the subject by the donor, which appeared in the *Archaeological Journal*, vol. lxiii., No. 249, March, 1906 :—

In the preface to the paper it is stated that "in early times we know that the south-eastern district of Britain was cut off from the interior by the Thames and its marshes, and that the first practical means of crossing this barrier was by the ford at Brentford, the next being 50 miles up stream at Wallingford.

"This Middlesex ford would therefore be a place of the first importance and also of general resort, since upon it converged the principal chariot or trackways for miles around, on each side of the river.

"In times of war this portal between two extensive areas would be jealously guarded and strongly protected, and this is proved by the numerous remains of pile fortifications which have now come to light, extending for a couple of miles along the Middlesex shore of the river, from Kew Bridge to Isleworth Ferry. The troops regularly guarding this position appear to have had a circular camp near by, higher up on the level ground, in a clearing midst the surrounding trees, situated on the tongue of land between the Brent and the adjoining brook, which commanded the fordway below. The next tribal line of defence was upon the wooded uplands of Middlesex, along which ran Grimms Dyke. At either end stood camps, at Hillingdon and Bush Hill, protecting the fords of the rivers Colne (Ux) and Lea."

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"The Ford at 'Old England,' Brentford.

"Bishop Gibson, writing in 1695, says that the Thames was in ancient times easily forded at Brentford, and is so still, there being

now at low ebb not above 3 feet of water. There is confirmation of this in the *Saxon Chronicle*, which states that Ædmond the Ironsides crossed here with an army twice in 1016. William of Malmesbury (1095–1143) on each occasion refers to the place as the Brentford vadum. Even at the present day, during a low spring tide, children in the warm weather may be seen wading well out into the river.

"There was but little tidal scour in those days, for irregular banks, shoals, weeds, reeds and fallen trees, &c., coupled with the lateral flow over miles of swamps, would all tend to impede the flow in the river proper. Constant dredging at this day takes place upon the gravel shingle in the Syon reach of the river to deepen the Brentford channel for navigation, and from the above various causes it can be imagined that 2,000 years ago the river at this spot was much shallower than at present, and therefore easily fordable at low tide. All the accessories of a ford convenient for military purposes were to be found here. On the Surrey side a wide and level approach over a firm and low-lying bank (B.M. 13) led down to a shallow river of no width, flowing in this reach over a broad bed of gravel.

"The passage across probably lay up stream, a little above the line of route of the present ferry. The old ford was a double one, as an arm of the Brent had afterwards to be crossed before ascending the gravel ridge (B.M. 25) which lies between the bend of the Brent to the north and the brook from Little Ealing. On the intervening triangle of land forming the delta of the Brent lay the town meadow, happily named and still known as 'Old England.' Its old appearance has now, alas! gone for ever; nearly all lost in docks and buried beneath railway embankments."

The following description is given of the stake :—"It is part of an oak sapling, is 3 feet long and 15 inches in circumference, roughly pointed at the lower end, and black as ink. There is little sign of decay, though, in process of drying, through exposure to the air, rifts or splits down the way of grain have appeared. The remainder of the sapling, which stood in and above the water, has of course long ago decayed or been broken off, but the stump owes its preservation to having been buried in the bed of the river. Its upper end, which projected a couple of inches above the bed, is frayed from contact with the dredger, or keels of passing vessels, and the action of river drift. The condition of some of the other stumps is not so good, it varies very much; the cores, however, are fairly sound and hard."

In December, 1903, Mr. Bunting, of the Thames Conservancy, wrote to Mr. Sharpe as follows :—"The remains of the line of stake defence still exist in the bed of the river for about 400 yards below Isleworth Ferry. It runs in a diagonal direction down stream from the Middlesex to the Surrey side, and their positions have been carefully ascertained. In the course of dredging, the stumps of many of the stakes have been extracted in the main channel, and those on the foreshore have been removed, as they became an obstruction or danger to navigation. The extracted stakes have from their appearance indicated that they have been tied or interlaced in some way or other."

Mr. Sharpe continues that "it can now with confidence be asserted that these works (the line of stakes) extended for about two miles along the course of the river . . . . the passage of the ford being about the centre. The number of vertical stakes used in a single line crossing the stream diagonally at either end and stiffened with two other lines below 'Old England' would, when driven in 6 feet apart, have amounted to between two and three thousand . . . ." There is also good evidence "that stakes were driven into the *foreshore* as well as the main channel; this accords with Caesar's description, when he says that the *bank* was also defended" :—

"B.C. JULY 54. CAESAR'S INVASION WITH 20,000 MEN.

"Caesar being aware of their plans, led his army to the Thames to the kingdom of Cassivellaunus. The river was passable on foot only at one place and that with difficulty. . . . .

"The bank also was defended with sharpened stakes fixed outwards, and similar stakes were placed under water and concealed by the river."

Mr. Sharpe's paper is illustrated by an old plan of the district around the Thames Ford B.C., a view of the river bank at "Old England," a photograph of one of the stakes, a plan of the position of the stakes in the river at the upper end of the line of fortifications guarding the ford, and some other maps relating to the history of this ancient ford.

J. M. H.

Heritiera utilis.—Herbarium specimens of a sterculiaceous tree bearing the native name "Nyankom" were received in April, 1908, from Mr. H. N. Thompson, who had collected them in the Gold Coast Colony. The material, which comprised a single branchlet with leaves and detached fruits, evidently represented an undescribed species of *Sterculiaceae*. In the absence of flowers, the genus could not be determined with certainty, though a comparison of the fruits suggested that it might be *Triplochiton*. As "Nyankom," however, was stated to yield a valuable timber, exported to Europe as "Mahogany," it seemed desirable to publish a botanical description, and it was accordingly described under the name *Triplochiton utile* (*Kew Bull.* 1908, p. 257). Almost simultaneously with publication, a further specimen, bearing female flowers, was received from Mr. Thompson, and examination of this showed that "Nyankom" belonged to the genus *Heritiera*. It must now be known, therefore, as *H. utilis*, Sprague.

H. utilis may be distinguished from the other species of *Heritiera* by its maple-like fruits. *H. Papilio*, Beddome, and *H. acuminata*, Wall., also have winged fruits, but the wing is of a different shape.

T. A. S.

Botanical Magazine for September.—*Aphelandra tetragona*, Nees, a Tropical South American species, has been in cultivation at Kew for many years. As *Justicia cristata* it was figured by Jacquin in 1798 from a specimen grown in the Hortus Schoenbrunnensis, and

it is probably the same as *Aphelandra cristata*, R.Br., figured at t. 1578 of this work, though in that plant the flowering spikes are much shorter and the leaves smaller. *Megaclinium purpureorachis*, De Wildem., was discovered by Mr. Louis Gentil on the Upper Lomami, a tributary of the Congo, in 1903, but the flowers were unknown till last year when a plant, originally procured from Messrs. F. Sander & Sons, bloomed in the Royal Botanic Garden, Glasnevin, and material was sent to Kew by Mr. Moore, from which the figure now published was prepared. It is much the largest known species of the genus. *Exostemma subcordatum*, Krug & Urban, is a pretty Rubiaceous shrub from the West Indies. Its white fragrant flowers have a slender tube, long linear corolla-lobes, and exserted stamens, and are borne in a large terminal subcorymbose head. The plant figured was received in 1903 from Professor Hansen, Director of the Botanic Gardens, Giessen, under the name of *E. floribundum*, but from that species it is distinguished by its longer calyx-segments and subcordate leaves. *Euphorbia Ledienii*, Berger, is a succulent species, with angular and spiny stems and branches, and clusters of small yellow flowers. It is a South African plant, and has been in cultivation at Kew since 1868. *Peliosanthes violacea*, Wall., var. *Clarkei*, Baker, differs from the typical form in having deep purple, instead of deep violet, flowers. It is widely spread in South Eastern Asia from the Khasia Hills in Assam, southwards to the Malay Peninsula. The plant figured was sent to Kew in 1904 by Mr. H. N. Ridley, who had obtained it in Perak.

Fockea capensis.—Dr. R. Marloth has kindly supplied us with the following interesting note on *Fockea capensis*, Endl.

The only specimen of this species known (until recently) is a plant cultivated at the Imperial gardens of Schönbrunn near Vienna, where it was sent over 100 years ago. No collector seems to have gathered flowering specimens in South Africa (*see* Mr. N. E. Brown's remarks in the recently published volume of the *Flora Capensis*, vol. iv., sect. 1, 1908, page 781), and only a year ago one of the illustrated magazines published a photograph of the Vienna plant, with the explanation that this was the only survivor of a now extinct species.

Mr. Brown, however, concludes his note more carefully by saying: "I have maintained the plant as a distinct species (from *F. glabra*, Decsne.), leaving future discoveries to prove or disprove the correctness of this view." How correct Mr. Brown's critical attitude was, is shown by the discovery of the wild plant in the neighbourhood of Prince Albert. Three years ago (1906) when visiting the district, I found young shoots protruding from a large tuber of an asclepiad on the Sandriver mountains, which are situated a little east of Prince Albert and belong to the quartzites of the Wittebergen series. The plant appeared to me to answer to the description of *Fockea capensis*, Endl., but my attempts to obtain flowering specimens through the help of some friends, to whom I sent photographs of the plant, remained fruitless until now; hence I did not venture to publish my observation. This year,

however, owing to ample rains during the summer months, the plants flowered freely, and Dr. P. C. Luttig at Prince Albert sent me an ample supply. There is no doubt about the identity, as the plants agree well with the description given in the *Flora Capensis* and as Mr. Brown has kindly verified my determination. I have only to add, that the follicles are spindle-shaped, $1\frac{1}{2}$ to 2 inches long, greenish-grey and speckled with brown.

The plant is fairly common, for I saw considerable patches of its shoots among the shrubs of the hill-slopes. The tuber reaches an enormous size, being of a somewhat irregular shape, from 1–2 feet long and 6 to 10 inches in diameter, weighing not rarely 50 pounds or more. The surface is brown, rough and warty, not whitish and smooth like those of *Fockea undulata*, N. E. Br. and *F. angustifolia*, K. Schum. These two species have turnip-shaped edible tubers, which the shepherds unearth and eat in the raw state or have them boiled with sugar and turned into a kind of preserve, much esteemed by the farmers. *F. capensis*, on the other hand, is not eaten and is distinguished by them as "berg-barroe," while *F. angustifolia*, is the "kam-barroe" and *F. undulata*, the "veld-barroe."

The plant, like many other Karroo plants, flowers according to the time of the rains. If they are scanty no flowers are produced for one or more years, if they are early, *e.g.*, in midsummer, flowers appear in March, otherwise they may be later, viz.: April, May or June.

R. Marloth.

The rediscovery of *Fockea capensis* by Dr. Marloth is one of considerable interest, as until now its native locality was unknown. In appearance, small crisped leaves and other details, the specimen forwarded to Kew by Dr. Marloth, appears to be quite identical with the type, and now that the plant has been rediscovered and seeds are procurable, it would be of great interest to learn something about the rate of growth of the tuber. When it was originally described by Jacquin (*Fragmenta*, p. 31, t. 34, fig. 5) between 1800 and 1804, he stated that the tuber was about 1 foot long and 6 inches in diameter, yet during the past 105 years this same tuber (for all efforts to propagate it have failed) appears to have made no material increase in size, as will be seen from the subjoined table of measurements made at the various dates it has been reported upon during a recent period of 20 years. The measurements have been kindly supplied by Dr. Zahlbruckner, Director of the Hofgarten, Vienna.

Circumference of tuber when reported :—

Dec. 15, 1886—40·8 cm.	Oct. 15, 1897—41·1 cm.
June 22, 1889—40·7 „	June 23, 1898—40·8 „
July 13, 1891—40·6 „	Aug. 1, 1899—40·9 „
June 20, 1892—39·7 „	Apr. 27, 1900—40·7 „
Sept. 1, 1892—40·8 „	May 25, 1902—40·4 „
June 14, 1893—40·9 „	Aug. 4, 1902—41·5 „
Feb. 13, 1895—40·6 „	Aug. 20, 1903—41·1 „
July 16, 1895—41·5 „	July 18, 1905—41·0 „
Mar. 28, 1896—40·6 „	

In the *Proceedings of the Linnean Society* for 1907, p. 7, will be found a note upon the Vienna plant, where the estimate I made as

to the rate of growth of the tuber, based entirely upon measurements made of a photograph, does not correspond with those given above and is evidently greater than is actually the case. The variations indicated by the table probably depend chiefly upon the amount of water stored up in its tissues, since, in 1892, when the circumference was least, Dr. Zahlbruckner notes that the tuber was "much dried up." From all this it would appear therefore that either the tuber attains its maximum development from the germination of the seed in a comparatively short period and afterwards does not enlarge, or else the rate of growth must be excessively slow. If the latter suggestion is correct some of the large tubers referred to by Dr. Marloth would probably be many centuries old.

N. E. B.

Bussea xylocarpa, *Sprague et Craib* [Leguminosae—Caesalpinieae]; a *B. massaiensi*, Harms, foliis 3–7-jugis et pinnis 10–15-jugis differt.—*Calliandra xylocarpa*, Sprague in *Kew Bull.* 1908, p. 290.

Bussea massaiensis was originally described from flowering material as a *Peltophorum*; and *B. xylocarpa* from fruiting material as a *Calliandra*. According to Harms, the affinity of *Bussea* is with *Caesalpinia*.

T. A. S.

Sir Joseph Banks, the Father of Australia.—Under this title Mr. J. H. Maiden, the energetic Director of the Botanic Gardens, Sydney, N.S.W., has welded a chain of historical events and facts in further vindication of Sir Joseph Banks' claims as a scientific man, and as a man to whom both the Old Country and the New Dominion are deeply indebted for his persistent and successful efforts in initiating the colonization of Australia. Mr. Maiden is an enthusiastic botanist, and he is much more; he is an enthusiastic historian, especially of the progress of botanical exploration in Australia, which began with the discovery of the country and was continued, thanks largely to Banks, through the earliest general investigations of the country. Dampier, the great navigator who discovered and explored some parts of the north-western coast about a century before Cook, was a born naturalist, and he brought away specimens of a few plants constituting the meagre flora of the part visited. It was otherwise with Cook when he first landed on the east coast. With him were Banks and Solander and several draughtsmen, whose task it was to collect, describe and draw the natural productions of the countries visited. Banks, of course, was the leader of this scientific staff, and Maiden claims for him that from this date (1770) onward his interest in the country and his activity in promoting its settlement and providing it with useful plants and animals never ceased. These facts are known to a few students of history; yet, as Maiden remarks, his services have not been adequately recognised either by Britain or by Australia. Owing to various circumstances, his share in this great work was overshadowed, and until the recent publication of his journal of the voyage, edited by Sir Joseph Hooker, and the publication of the Illustrations of Australian Plants, edited by Mr. James Britten, the general public

had little means of forming a correct appreciation of what he had really accomplished. Mr. Maiden's book of some 260 pages and 61 illustrations is intended to instruct the Australian people more especially in the part played by Banks, and the proceeds of its sale, it is hoped, will furnish a substantial contribution to the fund being collected for the purpose of establishing a memorial to him. It has been brought out at the expense of the State of New South Wales, and it is indeed an admirable *multum in parvo*, which should well fulfil the object desired. But the contents appeal to the Briton the world over, and should be widely read. Mr. Maiden dwells on the spot where Banks first trod the soil of the new continent, and where the colonization of the great country began, and his little book is calculated to feed the fire of true patriotism which has so lately burst forth. It consists largely of extracts from authentic publications and manuscripts relating to the events and persons concerned, of whom Banks is the central figure ; and it covers Banks' whole career. There is a short chapter on the advantages enjoyed by the young colony and by Kew from an interchange of seeds and plants. Unfortunately no records now exist of the plants thus exchanged. They were probably burned in 1849 with the correspondence and other documents connected with Kew during the long Aitonian period. The first edition of Aiton's *Hortus Kewensis* is, however, an index to the introduction of Australian plants by Banks. In this connection we learn from the historical records that Banks had to repeat his proposals to send useful plants by Government vessels, and his suggestions as to how they should be sheltered and treated during the long voyages of those days of sailing vessels. George Sutton—an ancestor of Sir Francis Sutton, now President of the New South Wales Legislative Council, and an ardent supporter of Mr. Maiden in his present work—was actively engaged in the conveyance of plants from this country to the infant colony and in one of his letters to Sir Joseph Banks, reproduced by Maiden, he gives a list of the plants he had succeeded in introducing alive. One is tempted to make extracts, but it is better to commend the book for perusal and reference.

W. B. H.